WHAT IS CLAIMED IS:

1. A group III nitride compound semiconductor device comprising:

a substrate;

an undercoat layer formed on said substrate and having a surface with convex portions each shaped like a truncated hexagonal pyramid; and

a group III nitride compound semiconductor layers formed on said undercoat layer and having a device function.

2. A group III nitride compound semiconductor device according to claim 1, wherein said undercoat layer is made of GaN doped with magnesium.

3. A group III nitride compound semiconductor device according to claim 2, wherein a magnesium concentration of said undercoat layer is not lower than 10^{20} /cm^3.

4. A group III nitride compound semiconductor device according to claim 2, wherein said undercoat layer is doped with an n-type dopant and is of an n type as a whole.

5. A group III nitride compound semiconductor device according to claim 1, wherein said substrate is made of one of sapphire, SiC and silicon single crystal.

6. A group III nitride compound semiconductor device according to claim 1, further comprising a sedimentary layer interposed between said undercoat layer and said substrate.

7. A group III nitride compound semiconductor device according to claim 1, wherein said group III nitride compound semiconductor layers have a function one of a light-emitting device, a photodetector and an electronic device as a whole.

8. A method for producing a group III nitride compound semiconductor device, comprising steps of:

forming an undercoat layer on a substrate so that said undercoat layer has a surface of a texture structure;

forming a growth suppressing material layer on said undercoat layer so that said undercoat layer is partially exposed; and

growing a group III nitride compound semiconductor layer on said undercoat layer and on said growth suppressing material layer by performing an epitaxial lateral overgrowth method.

9. A method for producing a group III nitride compound semiconductor device according to claim 8, wherein the step of forming said undercoat layer is performed under a condition of a temperature in a range of from 1000°C to 1200°C.

10. A method for producing a group III nitride compound semiconductor device according to claim 8, wherein said growth suppressing material layer is made of at least one member selected from the group consisting of Fe, Co, Ni, Cr, Mo, W, Ag, Rh, oxides of those members, SiO_X and SiN_X.

11. A method for producing a group III nitride compound semiconductor device according to claim 8, wherein said undercoat layer is made of a group III nitride compound semiconductor.

12. A method for producing a group III nitride compound semiconductor device according to claim 11, wherein said substrate is made of sapphire and said undercoat layer is made of AlN.

13. A method for producing a group III nitride compound semiconductor device according to claim 12, wherein a thickness of the AlN layer is in a range of from 0.2 to 3.0 μm.

14. A method for producing a group III nitride compound semiconductor device according to claim 12, wherein a thickness of the AlN layer is in a range of from 0.5 to 1.5 μm.

15. A method for producing a group III nitride compound

semiconductor device according to claim 8, further comprising a step of forming a sedimentary layer before the step of forming the undercoat layer.

16. A method for producing a group III nitride compound semiconductor device, comprising steps of:

forming an undercoat layer on a substrate so that a surface of said undercoat layer is formed as a sectionally trapezoid shape;

forming a growth suppressing material layer on said undercoat layer so that said undercoat layer is partially exposed; and

growing a group III nitride compound semiconductor layer on said undercoat layer and on said growth suppressing material layer by performing an epitaxial lateral overgrowth method.

17. A method for producing a group III nitride compound semiconductor device according to claim 16, wherein the step of forming said undercoat layer is performed under a condition of a temperature in a range of from 1000°C to 1200°C.

18. A method for producing a group III nitride compound semiconductor device according to claim 16, wherein said growth suppressing material layer is made of at least one member selected from the group consisting of Fe, Co, Ni, Cr, Mo, W,

Ag, Rh, oxides of those members, SiO_X and SiN_X.

19. A method for producing a group III nitride compound semiconductor device according to claim 16, wherein said undercoat layer is made of a group III nitride compound semiconductor.

20. A method for producing a group III nitride compound semiconductor device according to claim 19, wherein said substrate is made of sapphire and said undercoat layer is made of AlN.

21. A method for producing a group III nitride compound semiconductor device according to claim 20, wherein a thickness of the AlN layer is in a range of from 0.2 to 3.0 μm.

22. A method for producing a group III nitride compound semiconductor device according to claim 20, wherein a thickness of the AlN layer is in a range of from 0.5 to 1.5 μm.

23. A method for producing a group III nitride compound semiconductor device according to claim 16, further comprising a step of forming a sedimentary layer before the step of forming the undercoat layer.

24. A method for producing a group III nitride compound semiconductor device, comprising steps of:

forming an undercoat layer on a substrate so that a surface of said undercoat layer is formed as a pit shape;

forming a growth suppressing material layer on said undercoat layer so that said undercoat layer is partially exposed; and

growing group III nitride compound semiconductor layers on said undercoat layer and on said growth suppressing material layer by performing an epitaxial lateral overgrowth method.

25. A method for producing a group III nitride compound semiconductor device according to claim 24, wherein the step of forming said undercoat layer is performed under a condition of a temperature in a range of from 1000°C to 1200°C.

26. A method for producing a group III nitride compound semiconductor device according to claim 24, wherein said growth suppressing material layer is made of at least one member selected from the group consisting of Fe, Co, Ni, Cr, Mo, W, Ag, Rh, oxides of those members, SiO_X and SiN_X.

27. A method for producing a group III nitride compound semiconductor device according to claim 24, wherein said undercoat layer is made of a group III nitride compound

semiconductor.

28. A method for producing a group III nitride compound semiconductor device according to claim 27, wherein said substrate is made of sapphire and said undercoat layer is made of AlN.

29. A method for producing a group III nitride compound semiconductor device according to claim 28, wherein a thickness of the AlN layer is in a range of from 0.2 to 3.0 μm.

30. A method for producing a group III nitride compound semiconductor device according to claim 28, wherein a thickness of the AlN layer is in a range of from 0.5 to 1.5 μm.

31. A method for producing a group III nitride compound semiconductor device according to claim 24, further comprising a step of forming a sedimentary layer before the step of forming the undercoat layer.

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